XLV.—*Remarks on the Genus* Lichenocrinus.

By F. B. Meek*.

Perhaps of all the remarkable types of that protean order of animals known as the *Crinoidea*, there are few more curious and interesting forms (if really the *body* of a crinoid) than that for which Prof. Hall proposed the name of *Lichenocrinus*. Having recently had an opportunity of examining an extensive series of specimens belonging to both of the known species of this type, in the collections of Mr. C. B. Dyer and other gentlemen of Cincinnati, I propose to make a few remarks on the same, that may be of some interest to palæontologists, especially as this fossil is little known, and the specimens now obtained afford the means of giving a more extended description of its characters than that already published.

Prof. Hall's generic description of this crinoid reads as follows:—"Bodies parasitic on shells and other foreign substances. Form discoid or depressed-convex, with a proboscidiform appendage rising from the centre. Disk composed of an indefinite number of polygonal plates, and apparently having no distinct mode of arrangement. Proboscis perforate, and, in the known species, formed of five ranges of short plates alternating and interlocking at the margins."

From the specimens now known, the following more extended description of this fossil may be given:—

Discoid or depressed-plano-convex bodies, growing firmly attached to shells, corals, trilobites, and other marine objects, and entirely destitute of free or recumbent arms or pinnulæ, ambulacral openings, or pectinated rhombs. Free or convex side concave in the central region, and composed of numerous small, non-imbricating polygonal plates, without any definite arrangement; mesial depression provided with a very long, slender, perforated, flexible, column-like appendage, composed of five longitudinal series of short, alternately interlocking pieces. Attached side, when separated, presenting no sutures or openings, but in some conditions showing numerous, distinct, regularly arranged, radiating striæ, corresponding to radiating lamellæ that occupy the whole internal cavity from top to bottom.

Among the more remarkable features of this fossil may be mentioned its very curious system of radiating lamellæ occupying the whole internal cavity, and giving it, when the plates of the upperside are removed so as to expose these lamellæ in place and attached to the adhering side, almost exactly the appearance of the little fungioid coral *Micrabacia*. The entire absence, so far as known, of free or recumbent arms or pin-

* From Silliman's American Journal, October 1871.

nulæ, as well as of the most minute ambulacral or other openings, save the minute perforation into the slender column-like appendage, and the attachment of this appendage to the free side of the firmly adhering disk are also very anomalous features, if we view this disk as the body of a crinoid.

On examining one of these fossils, one of the first questions that suggests itself is, what can be the nature of this long slender appendage, not more than from four to eight or ten hundredths of an inch in diameter and several inches in length? Is it homologous with the so-called proboscis or ventral tube of other crinoids, or with the column of the same? Prof. Hall evidently entertained the former opinion at the time he wrote the diagnosis quoted above, though I was informed at Cincinnati that, after seeing other specimens than those from which his diagnosis was written, he inclined to the opinion that it is a column. That one or the other of these views is correct would almost necessarily seem to be the case; and yet there would appear to be rather strong objections to both of these conclusions, if we view the disk as the body of a crinoid. In the first place, if a column, why should the body, instead of being, as usual, attached by it, be always (when not accidentally detached) found growing firmly by the whole opposite side to foreign bodies, and this long appendage in all cases be left dangling free and, if viewed as a column, apparently useless? Again, if a column, connected with the free side of the body of an attached crinoid, how are we to account for the fact that no traces of any other opening than that passing in through this appendage can be seen, even by a careful examination under a magnifier, in any part of the body? In addition to this, it does not connect with the disk by a series of basal pieces, as is usually the case with the connexion of the column of a crinoid or cystoid to the body of the same, but, on the contrary, the plates of the disk diminish in size inward, and pass by easy gradations into those forming the base of this long appendage.

On the other hand, if we proceed to view this appendage as a proboscis, or ventral tube, connecting with the ventral side of the body, we are met by the objection of its extreme proportional length, slenderness, flexibility, and the fact that it seems to taper off nearly to a point at its free end. In Mr. Dyer's collection there is a piece, apparently of the free end of this organ, about an inch in length, and agreeing exactly in size, form, and structure with that of *L. Dyeri*, that is broken at one end and tapers to a slightly blunted point at the other end, which is composed of very minute pieces drawn together. In other examples, where three or four inches in

length of this appendage can be seen attached to the disk at one end, it tapers off until it becomes exceedingly slender at the free broken end. This character of its termination, especially when viewed in connexion with its length, slenderness, and other characters, would seem to be a strong objection to the conclusion that it is a ventral tube or proboscis. Still there might have been a minute opening at the extremity, closed by diminutive pieces, as we often see is the case with the opening of much larger crinoids.

While examining the specimens of this type, several solutions of the mystery of its structure suggested themselves, the first one of which was, that possibly the disk, viewed as the body, might really be only a peculiarly constructed root or base of attachment of a crinoid, the body of which grew at the free end of the long column-like appendage. This suggestion derives some support from the fact that the disk, although usually growing on the flat surfaces of shells &c., is sometimes found growing upon the side of the columns of other, larger crinoids, as well as on other uneven surfaces; and in such cases it is bent around to conform to the curve of the surface of attachment, just as we see in crinoid-roots similarly situated—while its whole interior is so filled with radiating lamellæ as to leave extremely little, if any, space for the viscera of an animal, and is, as already stated, apparently hermetically sealed, excepting the minute canal leading up into the long appendage. It is true that the roots of crinoids are generally formed of thickened and anchylosed rings or segments of the column; but Mr. Billings has figured the root of one type (*Cleiocrinus grandis*), apparently composed of an accidentally folded expansion of minute polygonal plates; and it is worthy of note that the column attached to this root is longitudinally divided by five sutures. It is also true that there is no example, so far as known to the writer, of any such system of radiated lamellæ being connected with the root of a crinoid; but this objection would doubtless apply with even greater force against the conclusion that this disk is the body of one of these animals.

On the other hand, among the strong objections to the suggestion that these disks are roots, may be mentioned their very regular symmetrical form, and the fact that no indications of a body at the free end of the column-like appendage have yet been observed, nor of a detached body with adhering portions of a column agreeing with this; while no free crinoid that might have been attached to this column in its early stages of growth is known in these rocks. In addition to this, the tapering and pointed extremity of this appendage would seem

to render it at least improbable that it had ever supported a body at that end.

Two other solutions of the difficulty suggest themselves, one of which is, that possibly the specimens, as we now see them, may not be the mature condition of the animal, but only one of the stages of development of some crinoid, which, if known in its adult condition, is supposed to be an entirely distinct type. The other is that the disks, as we now see them growing fast to other bodies, may be the adult condition of a crinoid that in its earlier stages of growth was supported on its little column, as in other types, being otherwise free, and that at a later period of its growth the column became free at its lower end, and was for a time trailed about by the floating body, which finally inverted itself and grew fast to other objects by what was originally its vault. The fact, however, that these disks attain a diameter of at least half an inch, with the elongated appendage four inches or more in length, would, even if known analogies supported such a view, seem to be a very strong objection to the conclusion that these are immature or embryonic forms; while, to say nothing of other strong objections that naturally present themselves against the last mentioned suggestion, the occurrence of these disks of all sizes, from the largest down to others less than a tenth of an inch in diameter, all alike growing fast to other bodies by the side opposite the column-like appendage, seems to demonstrate that this is their mode of growth from the first*.

In view of all that is now known of this curious fossil, it seems to me, without undertaking to express a positive opinion on the subject, that the weight of evidence (supposing that these disks are really the *body* of the crinoid) favours the conclusion that the long appendage is a ventral tube; but *if the appendage is a column*, then I should incline to the opinion that the disk is a peculiarly organized root, and that the body may be yet unknown, unless as an entirely distinct crinoid.

For the use of specimens of this fossil I am under obligations to Mr. C. B. Dyer, Mr. U. P. James, Mr. D. H. Shaffer, Dr. H. H. Hill, and Dr. R. M. Byrnes, of Cincinnati. Mr. Dyer's collection, however, contains much the most complete

* In a few very rare cases the disk has been found detached and showing the flat side marked by very regular radiating striæ. It is almost certain, however, from the fact that hundreds of specimens have been found growing firmly to other bodies, that these few separated individuals had become detached by the disintegration of the object upon which they grew, and that the radiating striæ are only the edges of the lamellæ within, exposed by weathering, as we also sometimes see on the upper side of weathered specimens.

and instructive series. Full illustrations, showing all its known characters, will be prepared for the reports of the Ohio Geological Survey. The two known species, *L. Dyeri* and *L. crateriformis*, occur in the Cincinnati group of the Lower Silurian, near Cincinnati, Ohio.

XLVI.—*Notes on Coleoptera, with Descriptions of new Genera and Species.*—Part I. By Francis P. Pascoe, F.L.S. &c.

[Plate XIV.]

List of Genera and Species.

TROGOSITIDÆ.

Elestora fulgurata.

OTHNIIDÆ.

Elacatis lyncea.
—— laticollis.

TENEBRIONIDÆ.

Bolitophaginæ.

Atasthalus (*n. g.*) spectrum.
Dysantes (*n. g.*) taurus.
Calymmus (*n. g.*?) cucullatus.
—— asperulus.
Bolitoxenus bifurcus.
Heledona nasalis.

Diaperinæ.

Allophasia (*n. g.*) Fryi.

Ulominæ.

Toxicum grande.

Zopherinæ.

Rhypasma querulum.
—— nanum.
Exeniotis (*n. g.*) collaris.

Ancylopominæ.

Ancylopoma (*n. g.*) punctigera.

Helopinæ.

Œdemutes pretiosus.
—— purpuratus.

Pycnocerinæ.

Odontopus physodes.
—— asperatus.
—— speciosus (*note*).

Amarygminæ.

Cyriogeton (*n. g.*) insignis.

Cyphaleinæ.

Cyphaleus Mastersii.

CISTELIDÆ.

Æthyssius eros.

PEDILIDÆ.

Egestria (*n. g.*) tæniata.
—— suturalis.

ANTHRIBIDÆ.

Nessiara histrio.
Habrissus heros.
Phides (*n. g.*) xanthodactylus.
Phaulimia Schaumii.

Elestora.

(Trogositidæ.)

Caput transversum, obliquum, paulo exsertum; *clypeus* brevissimus, arcuatus, sutura clypeali profunda; *labrum* minutum. *Mentum* brevissimum, antice late emarginatum; *labium* profunde bilobum, margine anteriore ciliatum; palpi articulo ultimo dilatato; *maxillæ* lobo interiore inermi. *Oculi* laterales, postice incurvi, tenuiter granulati. *Antennæ* breves, articulo basali subgloboso, secundo ad octavum brevibus, gradatim latioribus, tribus ultimis valde trans-